AbstractID: 14436 Title: Parallel Imaging: Technology, Clinical Applications, and Image Quality Issues

Parallel imaging in magnetic resonance imaging (or “pMRI”) is a family of techniques that uses the position of multiple RF coil elements to assist in spatial localization of signal, as opposed to phase-encoding techniques. This approach provides a wealth of new imaging options and advantages to the MR user. Basically, the reduction in the number of required phase encodings to produce an image can be used to acquire image data within a shorter window of time. This characteristic can be used in a variety of ways, to reduce image acquisition time; to increase image matrices for a given acquisition time; to mitigate geometric distortion; or to reduce SAR over the duration of a scan. Finally, pMRI can be implemented in virtually all existing sequences. The current use of pMRI is widespread as a result of these advantages, with a tendency toward increased utilization as the technology matures.

The advantages that pMRI provides are not without cost. pMRI is implemented in multiple “flavors”, all of which require some degree of mathematical prowess to understand fully. Although pMRI is frequently useful, it can cause problems within some imaging contexts (e.g., low SNR imaging, patients prone to movement). Artifacts associated with pMRI are odd and varied in appearance. Finally, an MR system that passes quality assurance tests for non parallel imaging on a given day may not have the necessary performance for pMRI. In 2005, the AAPM MRI subcommittee created Task Group #118 in order to provide guidelines to the Medical Physics community that address these concerns.

This presentation will provide an overview of pMRI, from concept to application. Conclusions and recommendations determined within Task Group #118 will also be summarized.

Educational Objectives:
1) To understand the basis of the pMRI technique, including required hardware and reconstruction methods.
2) To conceptualize what components of a quality assurance program may be important for MR systems using pMRI.
3) To gain insight into the suggested (and inappropriate) uses of the technique for clinical benefit.
4) To observe new directions of pMRI development and how this may change clinical practice in the next few years.